Trend Study 24-4-03

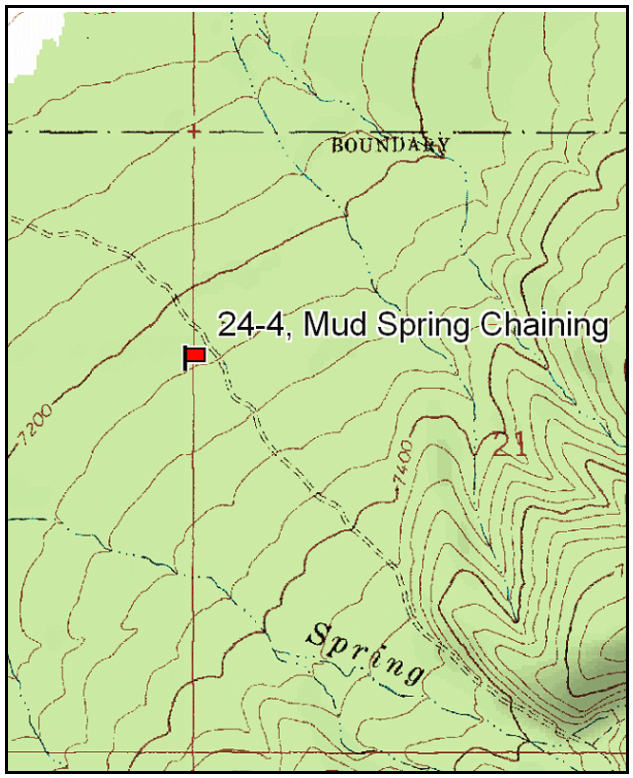
Study site name: Mud Spring Chaining . Vegetation type: Chained, Seeded P-J .

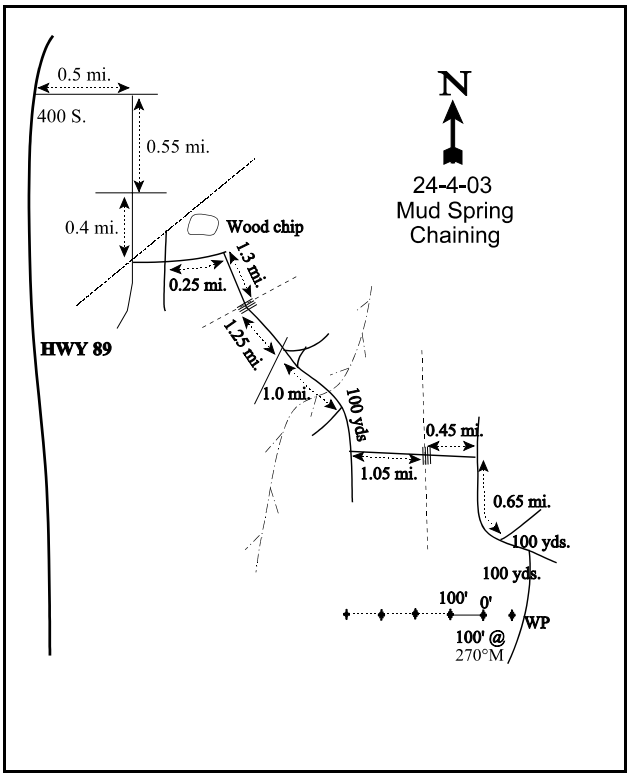
Compass bearing: frequency baseline 270 degrees magnetic.

Frequency belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft). Rebar: belt 1 on 5ft, belt 5 on 1ft, belt 4 on 5ft.

LOCATION DESCRIPTION

At the junction of Highway 89 and 400 south in Circleville go east for 0.5 miles. Turn right (south) 200 feet after crossing a bridge. Continue for 0.55 miles to a four-way fork. Go straight through the fork for 0.4 miles to a canal and 5 forked roads. Take the second left road going off at 45 degree angle towards a wood-chip operation. Continue on a road along a hay field for 0.25 miles and turn right. After 1.3 miles there will be a cattleguard and keep going for 1.25 mile to a fork. Stay right (straight) to another fork 1.0 mile away. Turn left at this fork for 100 yards to another fork. At this fork turn left again. After 1.05 miles you will reach the Forest Service boundary/cattleguard. From here continue for 0.45 miles to a fork, turn right and drive for another 0.65 miles. Continue for another 100 yards and stay right and continue to another fork, stay right again and drive to the witness post. The post is off the right side of the road. The 0-foot baseline stake has browse tag #7887.





Map Name: Mt. Dutton

Diagrammatic Sketch

Township 31S , Range 3W , Section 21

GPS: NAD 27, UTM 12S 4217825 N, 393837 E

DISCUSSION

Mud Springs Chaining - Trend Study 24-4

This trend study samples a chained pinyon-juniper woodland in the northwest portion of the herd unit. The site is located in the Mud Spring area at an elevation of 7,200 feet with a gradual slope (less than 6%) and a northwest aspect. This is a key area for deer during the winter and spring but deer pellet groups were not abundant with a quadrat frequency of only 8% in 1997 and 5% in 2003. Pellet group data from 2003 estimated light deer use at 7 days use/acre (18 ddu/ha). Some sign of livestock was encountered in 1997 and cattle use was estimated at 9 days use/acre (23 cdu/ha) in 2003. All cattle pats encountered in 2003 appeared to be from the 2002 grazing season. Escape and thermal cover is provided by a mature pinyon-juniper woodland that surrounds the chained area and many 4 to 12 foot pinyon and juniper trees are growing on the chained area. A finger of the 2002 Sanford fire burned just east of the study site.

The soil is relatively shallow and very rocky with an effective rooting depth estimated at just under 13 inches. Soil texture is a sandy loam which is neutral in reaction (pH 6.9). Rocks and pavement are common on the surface and in the profile. Soil temperature was high averaging 67°F in 2003 at an average depth of 10 inches. High soil temperatures are indicative of a dry soil profile. A considerable amount of organic matter has built up underneath the trees and shrubs. The area is dissected by several gullies which originate from the canyon to the northeast. The soil at the site is adequately protected by rock, litter, and vegetation. There are some areas of bare ground but they are not large or interconnected. The main erosion problem comes from runoff from the nearby canyon. Runoff events do not appear to be frequent as there is some vegetation growing in the gully bottoms. Runoff events are likely limited to spring and perhaps some high intensity rain events.

The key shrub species is mountain big sagebrush which accounted for 54% of the total browse cover in 1997 and 35% in 2003. It makes up nearly all of the understory shrub cover with a stable density of about 1,000 plants/acre since 1987. Total sagebrush cover averaged just over 6% in 1997 and 7% in 2003. Mountain big sagebrush has been light to moderately utilized in all years, shows good vigor on most plants, and has had low decadence prior to the 2003 reading. Young recruitment has also been good during all readings. Drought conditions in 2003 have caused an increase in decadence to 30% of the population and a decline in the number of sagebrush seedlings. Antelope bitterbrush is also present, although found in such low numbers (20 plants/acre) that it is not a significant component to the community.

Pinyon and juniper have become reestablished and/or released by the chaining. Point-quarter data from 1987 estimated 67 pinyon and 200 juniper trees/acre. Pinyon nearly doubled in density by 1991 to 129 trees/acre while juniper densities declined to 108 trees/acre. Point-quarter data from 1997 estimated 90 pinyon trees/acre and 127 juniper trees/acre. Average diameter of pinyon was 3 inches while that of juniper is 4.2 inches. Pinyon was mostly removed during the chaining, and the seedlings that were present at that time had grown to an average height of two feet by 1987. Point-quarter data from 2003 estimated 123 pinyon and 104 juniper trees/acre. Average diameter of pinyon was similar to 1997 at 2.6 inches but average juniper diameter increased to 5.2 inches. About 55% of the pinyon were in the 1 to 4 foot height class while 35% were 8 to 12 feet in height. Half of the juniper sampled in 2003 were in the 4 to 8 foot height class. Average cover of pinyon and juniper more than doubled between 1997 and 2003 from 5% to 13%. This old chaining needs to be retreated to eliminate the competition of these trees.

The most abundant grass is crested wheatgrass which accounts for 98% of the grass cover. No other seeded species were encountered on the study. Several other perennial grasses and one sedge are found on the site, yet they occur rarely. Forbs are rare.

1991 TREND ASSESSMENT

Percent rock, pavement, and bare ground cover all increased since 1987. Percent cover of litter decreased during the same period. Vegetative basal cover stayed about the same. Erosion is currently evident on the site but severe only in the washes. Trend would be considered slightly down at this time. The key browse species, mountain big sagebrush, has increased it's population by 26%, while the increaser, broom snakeweed had decreased it's numbers by 68%. This is a good upward trend taking place. The sagebrush density is still quite low at 1,265 plants per acre, but this would be expected to increase through time. The most common grass is crested wheatgrass with a quadrat frequency of 86%. Forbs occur in very low numbers. The herbaceous understory appears to have a stable trend.

TREND ASSESSMENT
soil - slightly downward (2)
browse - upward (5)
herbaceous understory - stable (3)

1997 TREND ASSESSMENT

Trend for soil appears stable with similar amounts of bare ground and litter cover compared to 1991 estimates. Trend for mountain big sagebrush is also stable with a similar density, light to moderate use, good vigor, and low decadence. Recruitment is good with a good reproductive potential (percentage of seedlings in the population) at 17% and 27% of the population consisting of young plants. The herbaceous understory is totally dominated by crested wheatgrass which currently accounts for 96% of the total herbaceous cover. It has remained stable since 1987 with a quadrat frequency ranging from 86% to 91%. Other grasses and forbs are rare. The herbaceous understory trend is stable with poor composition.

TREND ASSESSMENT
soil - stable (3)
browse - stable (3)
herbaceous understory - stable (3)

2003 TREND ASSESSMENT

Trend for soil is stable due to similar ground cover characteristics compared to 1997. There is still some gully erosion occurring due to runoff from the nearby canyon, but there is little erosion on site. Trend for sagebrush is stable. Density has increased slightly since 1997, but the number of decadent plants increased to 30% of the population. Use has remained mostly light to moderate with a few plants displaying heavy hedging. No seedlings were encountered in 2003 but young recruitment is still good with 16% of the population consisting of young plants. The biggest problem with the browse trend is the increase in cover of pinyon and juniper trees. Density has increased slightly but average cover has more than doubled since 1997 (5% to 13%). Pinyon and juniper currently make up 62% of the total browse cover. Total line intercept canopy cover was estimated at nearly 18% in 2003. This site could use a thinning treatment on pinyon and juniper trees. A continued increase in tree cover will further suppress understory vegetation. Trend for the herbaceous understory is stable but composition is poor. Sum of nested frequency of the dominant grass, crested wheatgrass, declined slightly but not significantly. Other perennial grasses occur rarely. Sum of nested frequency of perennial forbs also declined slightly and forbs remain rare in their occurrence.

TREND ASSESSMENT
soil - stable (3)
browse - stable (3)
herbaceous understory - stable (3)

HERBACEOUS TRENDS --
Management unit 24 , Study no: 4

Type	Species	Nested Frequency				Average Cover %	
		'87	'91	'97	'03	'97	'03
G	Agropyron cristatum	257	249	267	234	11.16	8.13
G	Aristida purpurea	-	-	-	4	-	.04
G	Bouteloua gracilis	$_{b}$57	$_{a}$30	$_{a}$10	$_{a}$10	.05	.10
G	Carex spp.	$_{b}$13	$_{b}$20	$_{ab}$8	$_{a}$-	.02	-
G	Oryzopsis hymenoides	4	5	3	-	.03	-
G	Poa fendleriana	$_{b}$13	$_{a}$1	$_{a}$-	$_{a}$-	-	-
G	Sitanion hystrix	$_{b}$31	$_{b}$29	$_{a}$9	$_{a}$5	.07	.04
G	Stipa comata	$_{b}$16	$_{ab}$10	$_{a}$2	$_{a}$-	.00	.00
Total for Annual Grasses		0	0	0	0	0	0
Total for Perennial Grasses		391	344	299	253	11.34	8.31
Total for Grasses		391	344	299	253	11.34	8.31
F	Arabis spp.	$_{b}$19	$_{a}$1	$_{a}$6	$_{a}$-	.01	-
F	Astragalus spp.	-	3	-	3	-	.00
F	Cryptantha spp.	7	3	3	-	.01	-
F	Cymopterus spp.	-	-	-	1	-	.00
F	Descurainia pinnata (a)	-	-	-	3	-	.00
F	Erigeron pumilus	$_{c}$19	$_{bc}$11	$_{ab}$2	$_{a}$-	.01	-
F	Hymenopappus filifolius	11	23	23	9	.22	.04
F	Machaeranthera canescens	-	1	2	1	.00	.00
F	Penstemon pachyphyllus	9	4	-	-	-	-
F	Phlox hoodii	3	-	-	-	-	-
F	Streptanthus cordatus	-	-	-	1	-	.00
F	Tragopogon dubius	1	-	-	-	-	-
Total for Annual Forbs		0	0	0	3	0	0.00
Total for Perennial Forbs		69	46	36	15	0.26	0.05
Total for Forbs		69	46	36	18	0.26	0.06

Values with different subscript letters are significantly different at alpha = 0.10

BROWSE TRENDS --
Management unit 24 , Study no: 4

Type	Species	Strip Frequency		Average Cover %	
		'97	'03	'97	'03
B	Artemisia tridentata vaseyana	31	33	6.21	7.33
B	Eriogonum microthecum	1	1	.00	.00
B	Gutierrezia sarothrae	11	18	.08	.34
B	Juniperus osteosperma	5	11	.03	4.46
B	Opuntia spp.	2	5	.03	.15
B	Pinus edulis	13	11	5.18	8.68
B	Purshia tridentata	1	1	-	-
B	Yucca spp.	1	1	.03	.15
Total for Browse		65	81	11.57	21.12

CANOPY COVER, LINE INTERCEPT --
Management unit 24 , Study no: 4

Species	Percent Cover	
	'97	'03
Artemisia tridentata vaseyana	-	5.05
Gutierrezia sarothrae	-	.20
Juniperus osteosperma	1.79	4.98
Pinus edulis	3.59	12.80

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 24 , Study no: 4

Species	Average leader growth (in)
	'03
Artemisia tridentata vaseyana	2.0

POINT-QUARTER TREE DATA --
Management unit 24 , Study no: 4

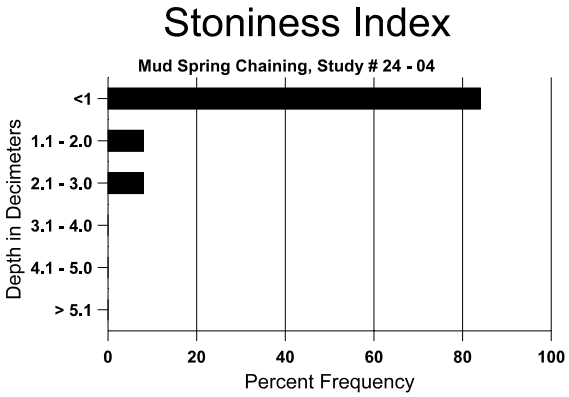
Species	Trees per Acre		Average diameter (in)	
	'97	'03	'98	'03
Juniperus osteosperma	127	104	4.2	5.2
Pinus edulis	90	123	3.0	2.6

BASIC COVER --
Management unit 24 , Study no: 4

Cover Type	Average Cover %			
	'87	'91	'97	'03
Vegetation	4.25	4.00	26.82	28.81
Rock	20.50	27.50	18.86	23.96
Pavement	4.25	6.75	13.48	12.83
Litter	53.75	41.50	37.68	34.77
Cryptogams	0	0	.06	.39
Bare Ground	17.25	20.25	14.53	16.46

SOIL ANALYSIS DATA --
Management unit 24, Study no: 4, Study Name: Mud Spring Chaining

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
12.7	67.7 (10.0)	6.9	67.0	18.4	14.6	3.6	38.4	608.0	0.5



PELLET GROUP DATA --
Management unit 24 , Study no: 4

Type	Quadrat Frequency		Days use per acre (ha)
	'97	'03	'03
Rabbit	9	16	-
Elk	-	1	-
Deer	8	5	7 (18)
Cattle	3	2	9 (23)

BROWSE CHARACTERISTICS --
Management unit 24 , Study no: 4

		Age class distribution (plants per acre)					Utilization				
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% poor vigor	Average Height Crown (in)
Artemisia tridentata vaseyana											
87	**933**	33	833	100	-	-	89	0	0	0	43/43
91	**1265**	233	833	366	66	-	18	0	5	0	11/13
97	**1040**	180	280	680	80	40	23	2	8	8	22/37
03	**1220**	-	200	660	360	60	15	8	30	18	19/28
Chrysothamnus nauseosus											
87	**0**	-	-	-	-	-	0	0	-	0	-/-
91	**0**	-	-	-	-	-	0	0	-	0	-/-
97	**0**	-	-	-	-	-	0	0	-	0	-/-
03	**0**	-	-	-	-	-	0	0	-	0	24/21
Chrysothamnus viscidiflorus viscidiflorus											
87	**0**	-	-	-	-	-	0	0	-	0	-/-
91	**0**	-	-	-	-	-	0	0	-	0	-/-
97	**0**	-	-	-	-	-	0	0	-	0	-/-
03	**0**	-	-	-	-	-	0	0	-	0	13/18
Eriogonum microthecum											
87	**0**	-	-	-	-	-	0	0	-	0	-/-
91	**0**	-	-	-	-	-	0	0	-	0	-/-
97	**20**	-	20	-	-	-	0	0	-	0	-/-
03	**40**	-	-	40	-	-	0	0	-	0	4/4
Gutierrezia sarothrae											
87	**3299**	-	433	2800	66	-	1	0	2	2	7/7
91	**1066**	-	300	633	133	-	0	0	12	3	4/4
97	**260**	-	20	220	20	-	0	0	8	0	8/12
03	**760**	20	-	540	220	740	0	0	29	11	7/9
Juniperus osteosperma											
87	**199**	-	133	66	-	-	0	0	-	0	79/39
91	**133**	33	100	33	-	-	50	0	-	0	108/33
97	**100**	20	20	80	-	20	0	0	-	20	-/-
03	**220**	-	60	160	-	20	0	0	-	0	-/-
Opuntia spp.											
87	**0**	-	-	-	-	-	0	0	-	0	-/-
91	**33**	-	33	-	-	-	0	0	-	0	-/-
97	**60**	-	40	20	-	-	0	0	-	0	6/8
03	**120**	-	-	120	-	-	0	0	-	0	4/10

		Age class distribution (plants per acre)					Utilization				
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% poor vigor	Average Height Crown (in)
Pediocactus simpsonii											
87	**0**	-	-	-	-	-	0	0	-	0	-/-
91	**0**	-	-	-	-	-	0	0	-	0	-/-
97	**0**	-	-	-	-	-	0	0	-	0	-/-
03	**0**	-	-	-	-	-	0	0	-	0	2/2
Pinus edulis											
87	**33**	33	33	-	-	-	0	0	-	0	-/-
91	**33**	33	33	-	-	-	0	0	-	0	-/-
97	**280**	-	60	220	-	20	0	0	-	0	-/-
03	**240**	-	20	220	-	-	0	0	-	0	-/-
Purshia tridentata											
87	**0**	-	-	-	-	-	0	0	-	0	-/-
91	**0**	-	-	-	-	-	0	0	-	0	-/-
97	**20**	-	-	20	-	-	100	0	-	0	23/52
03	**20**	-	-	20	-	-	0	100	-	0	30/44
Yucca spp.											
87	**0**	-	-	-	-	-	0	0	-	0	-/-
91	**0**	-	-	-	-	-	0	0	-	0	-/-
97	**20**	-	-	20	-	-	0	0	-	0	7/15
03	**40**	-	-	40	-	-	0	0	-	0	20/24